

AS/NZS 5033:2021



Australian/New Zealand Standard™

# Installation and safety requirements for photovoltaic (PV) arrays



AS/NZS 5033:2021

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# **Installation and safety requirements for photovoltaic (PV) arrays**

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## Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-042, Renewable Energy Power Supply Systems and Equipment, to supersede AS/NZS 5033:2014.

AS/NZS 5033:2014 will also remain current for SIX MONTHS and after this time it will be superseded by AS/NZS 5033:2021. Regulatory authorities that reference this standard in regulation may apply these requirements at a different time. Users of this standard should consult with these authorities to confirm their requirements.

The objective of this document is to address the safety requirements arising from the particular characteristics of photovoltaic systems. Direct current systems, and photovoltaic arrays in particular, pose hazards in addition to those derived from conventional a.c. power systems, including the ability to produce and sustain electrical arcs with currents that are not greater than normal operating currents.

At the time of publication there were limited Standards for arc detection and prevention for PV arrays. As standards develop, there will be a revision of this document, which will require the use of this technology for PV arrays.

Many new protection features for arrays when used in grid connected applications will be implemented in inverter systems and are required by the International Standard for inverters — IEC 62109-2. Both this document and AS/NZS 4777 require inverters that conform to IEC 62109-2 for grid connected PV systems.

There are a number of changes in requirements in this revision. They include but are not limited to —

- (a) change in the scope of this document with respect to maximum PV array power limit;
- (b) additions of provisions relating to d.c. conditioning units regarding voltage and current calculations;
- (c) changes to requirements for overcurrent protection and earthing;
- (d) changes to methods of PV isolation including for d.c conditioning units;
- (e) changes to requirements for wiring systems and connector requirements;
- (f) new signs, verification and commissioning requirements.

This document necessarily deals with existing types of systems but is not intended to discourage innovation or to exclude materials equipment and methods that may be developed in the future.

Revisions will be made from time to time in view of such developments, and amendments to this edition will be made when necessary.

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Statements expressed in mandatory terms in Notes to Tables and Figures are deemed to be requirements of this document.

The terms “normative” and “informative” have been used in this document to define the application of the Appendix to which they apply. A “normative” Appendix is an integral part of a document, whereas an “informative” Appendix is only for information and guidance.

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## NOTES



# Australian/New Zealand Standard

## Installation and safety requirements for photovoltaic (PV) arrays

### 1 Scope and general

#### 1.1 Scope

This document sets out general installation and safety requirements for electrical installations of PV arrays, including d.c. array wiring, electrical protection devices, switching and earthing provisions. The scope includes all parts of the PV array up to but not including energy storage devices, power conversion equipment or loads. This document also includes d.c. safety issues related to any associated power conversion equipment.

NOTE 1 Examples of d.c. safety issues related to power conversion equipment include integrated d.c. load break disconnection devices, earth fault detection, alarm and backfeed currents.

The interconnection of d.c. conditioning units intended for connection to PV modules are also included.

This document does not apply to PV arrays in the following electrical installation types:

- (a) Less than 100 W and less than 35 V d.c. open circuit voltage at STC.
- (b) Transportable structures and vehicles that are in accordance with AS/NZS 3001.
- (c) Boats in accordance with AS/NZS 3004.

This document does not apply to PV arrays on large-scale ground mounted PV power plants with restricted access to personnel and connected to dedicated high voltage systems. However, in the absence of an Australian Standard, this document should be used as guidance, subject to appropriate engineering principles being applied.

NOTE 2 Local jurisdictional requirements apply where applicable. 35V d.c. relates to the Decisive Voltage Classification A (DVC-A), as defined in IEC 62109-1.

NOTE 3 Attention is drawn to the fundamental safety principle of isolation described in AS/NZS 3000. Use of non-separated PCE means there is no isolation of ac or dc voltages between the input and output of the non-separated PCE. Safety designs and work principles needs to consider that any ac or dc voltage present on one side of the non-separated PCE is deemed present on the other side of the non-separated PCE.

The safety requirements of this document are critically dependent on the inverters associated with PV arrays conforming to the requirements of IEC 62109-1 and IEC 62109-2 and all power conversion equipment conforming to IEC 62109 series Standards.

This document shall be read in conjunction with AS/NZS 3000.

When the installation of PV arrays is connected to the grid, this document shall be read in conjunction with the AS/NZS 4777 series. When the installation of PV arrays forms part of a stand-alone power system, this document shall be read in conjunction with the AS/NZS 4509 series. When the installation of PV arrays includes battery energy storage systems, this document shall be read in conjunction with AS/NZS 5139.

PV arrays that fall within the scope shall be installed in accordance with AS/NZS 3000 except as varied herein, and with the requirement of this document.

#### 1.2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document:

NOTE Documents for informative purposes are listed in the Bibliography.